

to the mechanical arrangement of its ultimate parts; (*b*) in regard to its chemical composition.

The fourth and fifth lectures deal with, first, the variations from the typical structure found in fibres taken from the same animal and grown at the same time, in fibres from the same animal grown in different years, in fibres from the same animal grown under different climatic and other conditions, and in fibres from different breeds of sheep grown in different countries; and, secondly, the effect of these variations in the manufacturing processes.

There are a number of excellent illustrations which materially assist the reader.

It has hitherto been too commonly supposed that the sheep might be turned out upon our bleak and barren hillsides, of which no other use could be made, and left to its own resources; but this is doubtful economy, even as regards the land, and Dr. Bowman shows that as to the sheep it simply ruins the wool. "The wool and its character depend very largely not only on the health of the sheep, but also upon climatic and other influences. The mildness or severity of the season and the plenty or scarcity of food very largely affect the character of the wool. In very severe seasons there is a tendency to a thickening of the fibres, with greater irregularity in the length of the general staple and a greater rankness of the fleece, with undergrowth of short fibres and a greater irregularity in the diameters of the individual fibres and the different parts of the same fibre. The general character of the wool is also affected because from constant wetting and drying in the bad seasons the wool becomes tender and rotten and loses its brilliancy and lustre." "When examined under the microscope the individual fibres are found to be injured in their structure by the want of proper nourishment and the deficiency in the natural suint or grease, a great part of which is soluble in water, and when removed leaves the fibres dry and hask. Of course amongst well tended flocks these variations are reduced to a minimum, because they are supplied with suitable shelters from the storms and fed artificially when there is a scarcity of pasture." Most farmers think more of the mutton than of the wool, but whatever improves the one improves the other, and it would pay them well to devote more attention to the comforts of our hillside sheep, and even of those which are pastured in more favourable situations.

Great improvements have, we believe, been effected in apparatus for washing wool, but perhaps Dr. Bowman is right in saying that even yet sufficient attention is not paid to the temperature of the water. It seems to be forgotten that wool is an animal matter and that "the real base of the wool fibre is a body which very closely resembles, and is allied to, the albumenoids, and all these bodies are subject to very great changes in molecular condition when subjected even to moderate degrees of heat." Dr. Bowman made a number of experiments with "a bright-haired wool" to determine the effect on its lustre and strength of washing at different temperatures in pure water. He found that "wool which looked quite bright when well washed with tepid water was decidedly duller when kept for some time in water at a temperature of 160° F.; and the same wool, when subjected to boiling water 212° F., became quite dull and lustreless." As Dr.

Bowman elsewhere says, when water is heated by blowing in jets of steam, as is not unusual in wool-washing, the temperature varies in different parts, being nearly or quite 212° close to the steam jet, whilst very much lower at a little distance.

W. H. S. W.

#### PHYSIOLOGY OF THE EMBRYO

*Specielle Physiologie des Embryo. Untersuchungen über die Lebenserscheinungen vor der Geburt.* Von W. Preyer. (Leipzig: Th. Grieben's Verlag, 1885.)

THE vital processes of the embryo present so many difficulties in their investigation that, in spite of their great interest, they have hitherto received only a small share of the physiologist's attention. Prof. Preyer's new book will therefore be received with welcome as an important contribution to our knowledge of the subject; and is likely, on account of its completeness, to become a standard text-book.

The work is an almost exhaustive summary (extending to more than 600 pp. 8vo) of the results of investigations into this branch of physiology from the time of Aristotle downwards. Indeed, so large a proportion of other men's researches are included, that the title "*Untersuchungen* . . . von W. Preyer" would seem to require modification.

The reader may be a little disappointed with the earlier portion of the book, on account of the trite nature of some subjects which could hardly have been omitted; but the matter increases in interest with the progress of the work, and especially where the author's own researches are described. The style is not as condensed as could be wished: but this fault is not uncommon in scientific writings.

Although the common chick most rightly receives a large share of attention, yet other animals—mammalia, reptiles, and fishes—are not in any way neglected, and even invertebrates are occasionally touched upon. The most valuable observations are those on the guinea-pig, dog, &c. The author laments the scarcity of material and of opportunities for observation on the human subject; and recommends that in foundling hospitals and lying-in institutions a supply of apparatus should be kept ready for observing the physiology and pathology of the new-born; since much may be learnt from the phenomena, especially the changes, which occur within the first minutes or hours after birth.

In the first section, which treats of the embryonic circulation, Prof. Preyer shows the probability that in the chick the primitive blood, or hæmolymph, begins to move before the occurrence of the first heart-beat. This he attributes to the effect of heat, the heart occupying a higher position in the embryo than the vessels, so that by convection the blood tends to rise towards the heart and distend it. This explanation is not satisfactory on physical grounds: for it is difficult to realise that there can be a difference of temperature between the contents of a minute vessel and its surroundings sufficient to cause such a movement. Is it not equally probable that the change of specific gravity may be due to chemical changes in the hæmolymph; or, more probable than either, that the fluid is formed in the peripheral vessels and driven onwards by the pressure of osmosis?

Among the most important results of experiments are those connected with the effect of temperature and of chemical agents on the embryo; especially the very potent action of quinine and atropine on the primitive heart; and the comparative inertness of strychnia, curarin, and hydrocyanic acid on the more advanced foetus. These results, considered with those relating to the diffusion of substances between mother and foetus, have a practical bearing on the medical use of the various drugs during pregnancy. No less important therapeutically are the effects of change of blood-pressure in the uterine vessels; and a very practical though old question is fully discussed—namely, whether the umbilical cord should be divided early or late after delivery.

In certain experiments the coagulation of blood from the embryo was observed to be very slow. It would be interesting if it were shown that coagulability is acquired only shortly before the birth of the animal, when it first needs this property of the blood to guard it against hæmorrhage.

The most interesting section of the book is that which deals with the secretions of the embryo. The experiments of the author and other observers are collated, with the result of showing the early appearance and activity of some of the digestive fluids, and the comparatively late acquirement of the amylolytic faculty, particularly in the human species. The origin of the amniotic fluid is here discussed—how far it is derived from the maternal or from the foetal blood, and whether and to what extent the foetal urine contributes to its formation.

Prof. Preyer endeavours to find a satisfactory derivation for the word *amnion*. It does not appear to him possible to connect it with ἀμνίον, a receptacle for the blood of a victim in a sacrifice, with ἀμνός, a lamb, or other proposed sources; so he suggests an origin from α-, and μένος, strength, because of the delicacy and lacerability of this membrane. This may be physiological, but it is hardly philological. If we cannot be satisfied with the explanation that ἀμνίον in either sense was something which appertained to a lamb, we may conjecture an earlier origin from the root *am-*, around, seen in ἀμφί, *amputare*, and German *um*; in which case ἀμνίον may mean a receptacle or envelope.

There is no doubt that spontaneous movements of the embryo take place long before its maturity, and Prof. Preyer considers that muscular action occurs earlier than is generally supposed. He adduces the fact that the umbilical cord has already begun to twist in the human embryo at the eighth week, and asks, "How else could this take place, if not through the foetal movements?" Now it seems improbable that the muscular movements should be entirely or even mostly in one direction; and therefore some more satisfactory explanation must be sought. We would suggest that the twisting may be due to the excessive growth of the umbilical arteries, so that they are obliged to take a tortuous course: and, when a slight obliquity has once been established, every pulsation will tend to increase the spiral, and every movement of the foetus or of the mother will be taken advantage of; the cord and foetus revolving together until, with the growth of the foetus, the friction of the amnion puts an end to the rotation.

The section dealing with the senses of the embryo is scarcely less interesting than that on the secretions. In connection with this we find a discussion on the state of the nervous system before maturity: whether it be in a waking or a sleeping condition, or whether these conditions alternate with one another.

Among the appendices is one, by Dr. R. Ziegenspeck, of Jena, treating of the foetal circulation. There are also several coloured plates illustrating the circulation and other subjects. The usefulness of the book is much enhanced by the addition of a list of the literature on the special physiology of the embryo. The books and papers in this list (552 in all) are numbered and indexed; and, whenever either of them is quoted in the text, its corresponding number is given in the margin for reference.

F. J. ALLEN

### OUR BOOK SHELF

*The Animal Parasites of the Sugar Cane.* By H. Ling Roth, late Hon. Sec. to the Mackay Planters' Association. Reprinted from *Sugar Cane*, March and April, 1885. (London: Trübner.)

IT is within the knowledge of most people that when a matter of this kind is under consideration, there are never wanting those who are ready with suggestions—for the most part based upon a foundation anything but practical or logical. Quacks are always at hand with their "cures," greedy for the gain which it is the object of their impositions to intercept. Experience and common sense alike show that but two courses here lie open: either the cane-crop must be rooted up and something else substituted in its place, or the most searching inquiries must be instituted into the life-histories and conditions of existence of the organisms working the mischief.

The value of any publication on such a subject must, from the above considerations, be proportionate to the extent to which it assists the farmer in dealing experimentally with his enemies. Looked at from this standpoint, Mr. Roth's modest little pamphlet cannot fail to be of great service to the intelligent planter, for it embodies, together with the results of the author's practical experience, a bibliography of all that has been written on the subject.

Planters are beyond doubt largely a conservative body, and it is well known that years ago when first the failures of the Ceylon coffee-crops became disastrous, the attention of the grower was in vain directed to the tea-plant—then flourishing as an ornamental shrub in the gardens of certain residents. The deaf ear has since been opened, and the mourning of the disappointed coffee-grower is now being turned into the joy of the successful tea-planter. Unfortunately the conditions of growth of the sugar-cane will not admit of so easy a solution of the problem as that available in the above cited case, but the refrain of the paper before us is *more biology*. Nothing whatever can be done until the world is fully familiarised with the life-cycles and conditions necessary for the existence of the said parasites. The success which has recently attended the study of the liver-rot among sheep may be instanced as an example of what can be done in the field of applied biology, and there are among us young and competent workers ready to take the task in hand should opportunity offer.

The facts narrated on p. 2 of the paper are anything but encouraging to those who would seek Government aid. Much can be done by Governments, and it may be that when corporate bodies realise that pests of the category of those now occupying our notice are formidable even as an armed force, they will see fit to turn attention to them.